The Chemical Age

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Contents

NOTICES:—All communications relating to editorial matter should be addressed to the Editor, who will be pleased to consider articles or contributions dealing with modern chemical developments or suggestions bearing upon the advancement of the chemical industry in this country. Communications relating to advertisements or general matters should be addressed to the Manager.

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Chemical Industry and Trade

WE understand that arrangements are being made for the presentation to the Government Committee on Industry and Trade of a very complete statement on the present condition of British chemical industry from the manufacturing side. It is probable that, in addition to a general opening survey, there will be more specialised accounts of the chief branches, such as heavy chemicals, fine chemicals, dyestuffs, etc. The result will be a volume of contemporary evidence relating to the industry the like of which has not been prepared before, and if it is done as well as such work usually is the industry will be furnished with a very useful history of its recent developments.

This is one of many examples illustrating the value of a central organisation, competent to organise and carry through such enterprises, and able to command the assistance and co-operation of the right people. Without such organisation it is difficult often to get anyone with the necessary initiative to act, and even when one or two take up the task they are only feebly supported. We have at last reached such a state of chemical organisation that no really important matter is likely to be neglected for lack of initiative, and further, that where the necessary assistance is required from well-known scientists or individualists their services can generally be commandeered in the friendliest way. The advance in the last few years in this matter is one of the most notable developments in central chemical organisation—so rapid, in fact, that it requires some slight pause to realise how much things have changed from the old order.

Foreign Trade Results for 1924

WITH the completion of foreign trade statistics for the past year it is possible to review our business with overseas markets. Imports of chemicals, including dyestuffs and colours, have amounted in all to approximately £14,700,000, and are 9 per cent. larger than the figure recorded for the year 1923. Exports of chemicals during the twelve months have totalled £22,000,000, or about 2 per cent. lower than during the preceding year, although in the aggregate they are £4,500,000 larger than two years ago. In addition to these classes, soaps of all kinds were imported to the extent of £770,000 as compared with our exports of nearly £6,500,000. A feature of the year has been an upward fluctuation of imports due to special currency features of a temporary nature. As an example of greater business, a favourable movement has occurred in entrepôt trade, which now amounts to £1,400,000, and is larger by £110,000 than it was in 1923. This general movement for expansion is reflected in such trades connected with chemical output as the textile industries. A comparison of the two twelve-monthly periods shows a tremendous forward movement of 40 per cent. in the stocking up of raw materials by this section, and augurs well for future chemical demands.

On the export side chemicals have not made rapid progress, but reports for the year give good reason for confidence. In sulphate of ammonia, for instance, overseas sales reached 278,000 tons, and exceeded the previous year's total by more than 24,000 tons. Business in this product has been facilitated by the price reductions effected in the course of the year. Whereas during 1923 the average f.o.b. price was £16 3s. per ton, the present quotation is in the neighbourhood of £13 8s.. This compares favourably with home prices, which have fluctuated between £12 16s. and £14 2s. per ton, and also with competitors' quotations in outside markets. Export prices in many other commodities have also become competitive, and increased quantities are in consequence finding custom overseas. Glycerin sales have expanded by 80,000 cwt., potassium compounds are 7,000 cwt. larger, whilst compounds of sodium have increased by 400,000 cwt. A satisfactory feature in this connection is the improved business which has been effected in widely differing markets where conditions are much more optimistic than obtained a year ago. When consideration is also given to the improvement during the past year of 9 per cent. in British exchange with U.S.A. and the movement towards political stability of our Continental customers, satisfaction can be felt with the prospects ahead.

The Drying of Sulphate of Ammonia

A FEW weeks ago, in an interesting paper dealing with several practical points bearing upon the manufacture of sulphate of ammonia, Dr. Weyman expressed the view that sulphate of ammonia should only be dried down to that point at which it is in equilibrium with the atmosphere. Mr. Parrish, in his recent review of the developments in heavy chemicals in 1924, suggested that experience of neutral dry sulphate of ammonia under various hygrometric conditions reveals that humidity conditions must be recognised as a problem to be circumvented.

This statement recalls that, in June of 1920, Mr. J. T. Sheard, of the Sheffield Gas Co., put forward the theory that neutral sulphate of ammonia absorbs moisture from a damp atmosphere, and gives it up to a dry one. Following this declaration, Mr. Parrish contended that the absorption of moisture by sulphate of ammonia is closely related to relative humidity, but whereas, with an atmosphere of 50-55 per cent. humidity, neutral salt will maintain its dry and drillable character, ordinary sulphate with 0·1 to 0·2 per cent. of H_2SO_4, contained 0·1 to 0·2 per cent. of water—sufficient to render the salt undrillable. On this basis, it is clear that the neutral and acid qualities cannot be placed on common ground.

As, however, the saturation of the atmosphere varies from day to day, there cannot be any fixed point to be taken as a standard for drying, except, of course, a minimum moisture content is attained. But atmospheric conditions may be such that actual deposition of water occurs. Thus, sulphate despatched in a dry and drillable condition may, prior to being applied to the land, be stored in a warehouse or barn, where it will become moistened by dew and its drillable quality impaired. This, we take it, is the difficulty which needs to be surmounted. The calcium cyanamide producers were originally faced with a similar proposition, on account of the deliquescent nature of their material. But a fairly satisfactory solution has been found in the use of a special kind of package. Perhaps it is in this direction that sulphate manufacturers will turn their attention. At any rate, time will show.

The Chilean Nitrate Scare

THE course of events on the Stock Exchange is not necessarily a reliable indication of the true state of affairs surrounding any particular industry, and those who understand anything about the world position of fertilisers will already have come to the conclusion that there was no justification for the debacle amongst the shares of nitrate-producing companies with which the year opened. The scare was set going by the publication of a report which emphasised the growing importance of synthetic processes and insisted that they were becoming a serious competitor with the Chilean natural product. This is, of course, by no means the first occasion on which the synthetic bogey has been served up, and while the multiplication of combined nitrate plants in Europe is a factor which cannot fail to make itself felt there is really no ground for supposing that the great Chilean industry is coming to a end just yet.

The crux of the whole position would seem to be that owing to the development of new areas there has been a very considerable increase in productive capacity, but the increase in consumption of nitrate of soda is smaller than the increase which has in recent years occurred in all the other standard fertilisers, so that there is some danger of the augmented output not being absorbed. This is a situation which cannot, of course, be permitted to continue, and possibly the only effective remedy is a general lowering in the price of nitrate. It is being urged that in order to assist the industry the Chilean Government should reduce the export tax of 50s. per ton, but this tax has come to be regarded as the mainstay of the country, and it is said that it represents about 60 per cent. of the whole revenue of the Chilean Government. It is unlikely, therefore, that the tax will be reduced until the industry is really threatened. We have often heard the opinion expressed, however, that ample scope is offered for producing nitrate very much more cheaply than is now being done. It was, we think, Dr. H. A. Curtis, of Yale University, who stated some short time ago that of the nitrate which is present in the raw ore 25 to 40 per cent. is not recovered, while for the most part the methods of heating employed are wasteful. There are also unnecessary overhead charges incurred in carrying along high-production-cost *oficinas*, which should be abandoned to make way for lower-cost producers.

Taking all points into account, and assuming that there is some general inefficiency in the industry, and, therefore, opportunity for improvement, there need be little hesitation in saying that, if faced with a crisis, the industry could undoubtedly effect economies which would fully counteract any lowering of prices. It is evident, therefore, that Chilean nitrate is really in a fairly strong position to face competition.

Therm Yields from Welsh Coal

ONE of the main lines of inquiry being carried out by the Fuel Research Board is concerned with the physical and chemical survey of the national coal resources, and this involves the determination of the suitability for various purposes of the coal seams investigated. With this object in view large-scale tests of suitably selected coals are carried out from time to time, and the most recent report which has lately been issued by the Board relates to results obtained with a typical South Wales coal. The scheme of the investigation provided for the carbonisation of the coal at average combustion chamber temperatures of 1,250–1,260° C., and for the use of three different percentages of steam, namely: 5, 12·5, and 20 per cent. An analysis of the results obtained corroborates in a striking manner the efficacy of the modern method of admitting steam to the charge during the process of carbonisation. In a special test without steam the gas yield obtained was 12,000 cubic feet per ton of coal, representing 65 therms. When 5 per cent. of steam was employed the gas yield was enhanced to 15,070 cubic feet (representing 74·3 therms), and with 20 per cent. of steam the gas yield was 19, 100 cubic feet, or 88 therms.

The point to bear in mind is that the South Wales field is not regarded as being specially rich in gasmaking coals, nor have these coals been considered as particularly suited to the conditions prevailing in the con-

tinuous vertical retort. For this reason the Board's latest investigation must prove particularly encouraging to coal carbonisers in Wales and the West of England who, owing to their proximity to the Welsh fields, have little in the way of economic alternatives. Assuming that no mechanical or physical drawbacks are found in actual practice with such coals it would seem that the Board's report should stimulate the adoption of the continuous vertical retort, for a yield of 88 therms would not be despised even by those who are in the fortunate position of being able to carbonise some of the much sought after varieties of Yorkshire coals.

Dr. Forster's Address

THE presidential address of Dr. M. O. Forster to the Indian Science Congress recalls, in its style and some of its contents, the brilliant address on the laboratory of the living organism which he delivered as President of the Chemistry Section of the British Association. Very rarely indeed does the gift of vivid and picturesque presentation, which suddenly arouses one to the romance of accepted commonplace, touch higher standards than those which Dr. Forster's addresses of this order repeatedly reach. The address, too, is a reminder that India has gained something in compensation for the loss which British chemistry suffered in Dr. Forster's departure. One thing in particular all might learn from it—namely, that the scientific life, far from being a surrender to materialism, is one of high and wide vision, with a faculty of sane and critical appreciation. It was on November 7, 1922, that Dr. Forster took up his duties as Director of the Indian Institute of Science, Bangalore, and the gifts of imagination could nowhere be more necessary than in a situation demanding an understanding of two very different races and civilisations. That Dr. Forster has succeeded in understanding the Indian mind is shown by his election, after little more than two years' residence, to the Presidency of the Indian Science Congress, the first occupant of which was Sir Asutosh Mookerjee.

Better Prospects

FAVOURABLE reports continue to reach us respecting the improving prospects of the Society of Chemical Industry. The recent visits to the sections have had the effect of brightening up local interest, and a considerable group of new members has already been brought in. This quite justifies the view we have always taken that the closer the relation between the central organisation and all the branches the better it must be for all. In any organisation which covers the whole country there is a danger of sectional isolation, and the remoter sections are apt to assume that very little is done for their benefit. Criticism—which, after all, is very much preferable to indifference—often follows, and if the fatal mistake of resenting and trying to suppress it is made, the result is to make matters worse. One of the healthiest signs a big organisation can have is criticism from the remoter parts. This always gives an opportunity of explaining away misconceptions and ends in increased mutual respect and confidence, as well as in a quickening of that local interest which is essential to success.

Points from Our News Pages

Some New Uses of Silicate of Soda are described by Mr. Rex Furness (p. 48).

The first instalment is published of Dr. M. O. Forster's Presidential address at the Twelfth Indian Science Congress (p. 50).

Interesting developments in the Stream Line Filter, described at the Oil and Colour Chemists' Association, are reported (p. 52).

An interesting letter on the Tar Products industry is contributed by Mr. C. J. Goodwin (p. 54).

The trade figures for December show a considerable increase in imports and an even greater decrease in exports (p. 54).

Why high explosives strike downwards is explained in the report of a lecture by Sir Robert Robertson (p. 55).

Distinct improvements in the wages of chemical workers result from the recent agreement between the Drug and Fine Chemical Manufacturers' Association and the National Drug and Chemical Union. For the first time a list of definitions for all skilled and semi-skilled workers has been drawn up (p. 55).

The death is announced of Mr. Alexander Hamilton (p. 56); Mr. J. Hands (p. 56).

Professor J. W. Hinchley has resumed work after three months' absence through illness (p. 56).

The new president of the American Chemical Society is Professor James F. Norris (p. 56).

The voluntary liquidation of Holders (London), Ltd., soap manufacturers, is recorded (p. 60).

Our London market report shows a fairly satisfactory state of affairs, and export inquiry has been moderately good (p. 61).

Our Scottish chemical market reports moderately good inquiry in the heavy chemical market. Inquiries are more numerous and the general state can be considered satisfactory (p. 64).

Books Received

ORGANIC MEDICAMENTS AND THEIR PREPARATION. By Ernest Fourneau. London: J. & A. Churchill. Pp. 262. 15s.

CHEMISTRY IN THE SERVICE OF MAN. By Alexander Findlay. London: Longmans, Green and Co. Pp. 300. 6s.

The Calendar

1925		
Jan. 19	Institute of Chemistry (Manchester Section): Social evening. 7 p.m.	Engineers' Club, Albert Square, Manchester.
19	Institute of Chemistry, (Manchester Section): Social Evening.	
19	Royal Society of Arts: Cantor Lecture (I): "Radiological Research—A History." V. E. Pullen.	John Street, Adelphi, London.
19	University of Birmingham Chemical Society: Presidential Address. Professor G. T. Morgan. 5.30 p.m.	Chemical Lecture Theatre, Edgbaston.
20	Society of Dyers and Colourists (Leeds Junior Branch): "Chrome Blacks." F. L. Goodall. 5.30 p.m.	
20	Sir John Cass Metallurgical Society: General Discussion, "Works Practice."	London.
20	Royal Photographic Society: Kinematograph demonstration of some experiments in physics. 7 p.m.	35, Russell Square, London, W.C.1.
20	Mineralogical Society: Papers by Miss K. Yardley, J. Parry, Dr. F. E. Wright, Professor P. N. Chirvinsky, Dr. L. J. Spencer. 5.30 p.m.	London.
21	Society of Glass Technology. 2.30 p.m.	University, Edmund Street, Birmingham.
22	Institute of Chemistry (Belfast Section): "Some Aspects of Modern Plant Chemistry." Professor James Small.	Queen's University, Belfast.
23	Royal Institution of Great Britain: "Science and the Cotton Industry." Dr. A. W. Crossley. 9 p.m.	21, Albemarle Street, London.

Some New Uses of Silicate of Soda

By Rex Furness

Some interesting suggestions are made by the author respecting the use of silicate of soda in various industrial operations—including barrel-lining, paint manufacture, concrete treatment and road construction, the surfacing of oil and water tanks, and the production of casein-silicate adhesives.

SILICATE of soda was used to a comparatively slight extent during the first half century after its first technical production, and even after Gossage discovered its value to the soap manufacturer the consumption increased but slowly. For the past quarter of a century, however, the older manufacturers of silicate of soda have been developing new applications, so that immense quantities are used today both in this country and abroad. The old time use of silicate as a cleansing and hardening agent in soap has increased with the recognition that it cannot be classed as an adulterant or "filler" merely, whilst very large quantities are employed as adhesives in paper box and bag making, built-up paper and wood products, asbestos products, etc. In addition, silicate is used in paper making, textile dressing, finishing and bleaching, abrasive wheel manufacture, water softening, oil refining, and many other industries. Silicate forms the raw material for the production of the now well-known silica gel, and the artificial the zeolite "Doucil," used in water softening, gas and vapour absorption and so forth.

Some of the more recent applications are, perhaps, not so well known, and it is proposed to describe its application in barrel-lining, paint making, casein adhesive manufacture, and the hardening and surfacing of concrete—especially in surfacing concrete roads, floors, and oil and water tanks. In addition, the construction of silicate-bound roads of the ordinary macadam type will also be described.

Varieties of Silicate of Soda

Silicate of soda is a term which covers a number of definite commercial products. It cannot be too strongly emphasised that a special silicate, with definite chemical and physical properties, is usually required for any one particular application. The complex inter-relationships which exist between the alkali-silica ratio, the density viscosity, and water content have demanded careful and prolonged research before products ideal for specific purposes could be marketed. This point has been carefully elaborated in a previous article of mine upon the use of silicate as an adhesive. Thus, for instance, the old type of "water glass," used largely for preserving eggs, is quite a different product from that employed in surfacing concrete tanks, and this again differs markedly from the many adhesive silicates. The various products are not interchangeable, in the ordinary course of events, if full satisfaction is to be gained. Again, the addition of a small amount of a foreign compound often markedly increases the value of plain silicate, as in the so-called "Pyramid" barrel-lining compound, the basis of which is essentially silicate.

Barrel Lining

Silicate of soda, or preferably a carefully standardised technical preparation, is of value in lining oil barrels, and large distributors of lubricating oil are finding this treatment more satisfactory and economical than the use of glue solutions. The method of application is simple. Barrels are thoroughly cleansed—if necessary—by means of hot 2 per cent. soda ash or caustic soda, after any coopering required has been effected. The dried barrels are thoroughly impregnated by shaking a suitable solution of silicate into intimate contact with the interiors for several minutes. Excess of silicate is drained—for subsequent re-use—and the barrels are dried. The amount of silicate taken up varies with the porosity of the wood, but an average of from one to two pounds retention may be assumed. Three to four gallons of the solution are usually placed in each barrel.

Special barrel-cleaning plant may be used with advantage, while a simple method of rapid silicate treatment consists in allowing the charged barrels to roll down a specially constructed slide, which imparts a rocking motion to the barrels, passing them, bungs downwards, over a trough by means of a conveyor, and finally drying by means of hot air blasts. The treatment is preferably given immediately prior to the filling of the barrels.

By this means, a perfect tough, elastic, impermeable, glassy film is formed over the interior surface of the barrels, which thus become quite oil-tight. In the unlikely event of a small portion of the lining becoming detached and mixing with the lubricating oil, it is noteworthy that the film produced from the right type of silicate lining compound is soft and will cause no damage to any moving part with which it may come in contact.

Silicate lining is cheaper than glue lining, and the solution drained off during the lining operation can be re-heated repeatedly without suffering deterioration. Silicate compound is much easier to prepare than glue solution, and it is inodorous and incapable of fermentation or mould growth. Edible oil barrels are being lined with silicate compound by large distributors.

Silicate in Paint Manufacture

Minor applications of silicate of soda have been made in the manufacture of ordinary paints, but its chief potential use is in the preparation of special paints, such as aluminium paint for application to surfaces which are to be heated considerably. Thus, it provides an ideal vehicle for the aluminium paint used upon stoves and furnaces on account of its low heat-radiating power. Moreover, the very nature of the vehicle is such as to resist the action of heat, such as is seen when vehicles with an organic constitution are employed. Further, aluminium paint is a poor absorber of heat, so that the outsides of tents, huts, etc., may conveniently be treated with silicate-aluminium paint in order to ensure a cool interior during hot weather.

Paint technologists will be able, no doubt, to improve upon the simple recipe given below, but this possesses the merit of convenience and cheapness. If the right type of silicate be chosen, the paint gives a surface which is resistant to abrasion and the elements, and which does not chip. When applied to furnaces and the like the initial heating from cold should be gradual, so that disruption of the paint film by the rapid evolution of steam (from the water in the silicate) does not occur. The paint does not generate gas during storage by the action of the silicate upon the aluminium—again, if a highly "neutral" silicate compound of the correct composition be used—but it is advisable to prepare it in open vessels, since adsorbed air upon the finely powdered aluminium may be evolved.

For the preparation of the paint, it is stated that silicate solution of density 1·2 should be employed, the finely powdered aluminium being thoroughly intermixed by vigorous agitation.

Experiment will demonstrate, however, that the density of 1·2 is not a determining factor in the successful production of a paint, which may be readily made in different varieties by those skilled in the art.

Silicate and Concrete

Considerable attention is being paid to the use of silicate for hardening the surface of concrete and rendering it impervious to oil and water, and dustless on account of its resistance to abrasion. With the increase in motor transport and consequent probable development of the concrete roadway, it is very probable that silicate will be greatly in demand. Careful attention to the special type of silicate of soda most suitable for this purpose has been paid by several large manufacturers in this country and their products have survived the test of experience.

It is probable that the effect of silicate upon concrete is to increase the rapidity of hardening of the surface, the depth affected being dependent upon several factors, such as the porosity of the concrete, the dilution of the silicate employed, the amount of silicate retained, etc. Thus, a roadway may be opened for traffic at a date much earlier than would have been the case had silicate treatment not been given. Moreover, the risk of damage to the surface in the early days of the life of the road is minimised, so that the part of the concrete untouched by silicate has an oppor-

tunity to harden naturally to its full extent, whilst the rapidly hardened surface has been sustaining the wearing effect of the traffic.

The action of the silicate is simple. Reaction takes place with the calcium hydroxide which is produced during the setting of the concrete, insoluble calcium silicate and possibly silica being formed in the interstices of the concrete. Thus a hard, non-slipping, dustless, and oil and waterproof surface is quickly formed, while the free alkali has also its effect upon the rapidity of the hardening—a fact which has been overlooked in some quarters.

One of the chief merits of the silicate treatment of concrete resides in its simplicity and economy. It is only necessary to dilute the commercial silicate supplied several times with water—say, one part of silicate to four of water—and to apply this evenly to the road surface—previously made clean and dry—several days after the placing of the concrete. Some authorities quote fourteen days after laying as the ideal time to apply silicate, but others have obtained good results within a very few days. The diluted silicate is sprayed by hand or from a cart and brushed well into the pores of the concrete. After drying overnight, a second application of silicate solution is made, and, again after drying, a third.

The cost cannot be definitely quoted, for different concretes will take up different quantities of silicate, but it is cheaper, as well as more effective, than many road surfacing treatments.

It must be emphasised, however, that silicate treatment is not to be regarded as an alternative to good workmanship. Concrete must be well made, due regard being paid to quality of cement and aggregate, quality and quantity of mixing water, and so forth, and all the normal precautions taken in the laying of the road. Silicate will not make a badly-laid road good, but it will make a well-laid road better.

Silicate in Macadam Road Construction

The concrete road has not attained universal popularity, however, and for many years it is probable that macadam roads will be favoured in this country especially, perhaps, in rural districts and in localities where good stone is easily and cheaply available. The use of silicate of soda in the construction of such roads is growing, as its merits are becoming realised. Reports in this connection come chiefly from abroad, and especially from Switzerland and France. Thus, at Locle, Switzerland, a silicate-bound road was constructed several years ago and has apparently given general satisfaction. After three years of wear, during which time it was subjected to many hundreds of motors every day, there were no holes to be seen and the general condition of the surface was stated to be excellent. Moreover, users were unanimous in their praise of the surface, which is hard and non-slipping, relatively dustless in summer and remarkably free from "mud" in winter. Disintegration under the action of frost and thaw has been inappreciable.

Experts have visited the town of Locle and subjected the road to critical inspection before proceeding with the construction of experimental portions of road at Dourbes, France, and although the final reports of their own trials are not to hand, their report upon the Locle road is warm in its praise.

Silicate hardens and binds the roadway material by means of two reactions, namely (1) an immediate setting around the stone pieces where its adhesive properties, dependent upon absorption, evaporation, etc., serve to bind the roadway, and (2) a slow chemical action with the carbon dioxide of the air. Thus, the construction of the road is simple, for the stones and fine sand, or other type of binding agent, are well impregnated with silicate and heavily rolled until silicate appears at the surface.

Impervious Oil and Water Tanks

Silicate of soda is used to a considerable extent to-day for giving a hard and impervious surface to oil and water tanks. It will be clear that the hard, impenetrable surface which is produced by the interaction of silicate with the free lime of the set concrete is the factor which renders oil and water resistance effective. Thus, whilst the main bulk of the concrete is hardening naturally—during which period it would be very susceptible to disintegration under the action of oil or water—the specially hardened surface resists penetration. Oil tanks so treated have given every proof of the value of the application of silicate. The method of use is similar to that noted in the case of concrete road surfacing.

Similarly, in the case of water tanks, basins, etc., advantage may be taken of the silicate treatment to ensure initial and permanent imperviousness and freedom from the danger of disintegration.

Garage and Factory Floors

The fact that by means of silicate treatment concrete floors may be made dustless, oil and water proof, and free from the danger of disintegration is of particular importance in garages and factories. Special types of floors have often been laid in garages, but a plain concrete floor, surfaced with silicate of soda, will provide all that is needed, and, being resistant to oil and water penetration, will not be liable to disintegrate under heavy load. It will also resist the abrasive action of heavy motor traffic. Concrete foundations around machines in factories are suitably treated with silicate, for the danger of oil penetration and disintegration of the concrete are real enough in the absence of treatment. In general, factory floors may well be silicate-surfaced since the dustless character attained is well worth the small cost incurred.

Casein-Silicate Adhesives

The manifold uses of silicate of soda as an adhesive have been fully described in a previous article from my pen, but in one regard they are not quite effective. Although conferring damp proof qualities upon the materials bound with their aid, silicate adhesives are not absolutely so proof against water as to allow immersion of the bound articles for hours on end. Thus, for aeroplane work, certain furniture and wood panel work, a more waterproof adhesive is demanded. This is readily prepared by mixing milk of lime and a cream of casein and thoroughly incorporating silicate of soda. A small amount of copper chloride may be added as a final step if desired.

The quantities required are as follows:—100 parts casein in 220–230 parts water; 20–30 parts lime (hydrated) in 100 parts water. These two mixtures prepared separately are quickly mixed by vigorous agitation, and 70 parts of silicate of soda are added, again with effective agitation; 2–3 parts of cupric chloride in 30–50 parts of water may be added as a final step.

An American Editor's Greeting

THE following amusing card reaches us from Dr. H. E. Howe, editor of *Industrial and Engineering Chemistry*, Washington:—

We trust our genial colleague's prayer may be fully realised. For ourselves, we shall try to score no more than are inevitable.

The Message of Chemical Science to India—(I)

By Dr. M. O. Forster, F.R.S.

Our readers will be glad to have substantially in full the fine presidential address delivered by Dr. M. O. Forster, Director of the Indian Institute of Science, at the Twelfth Indian Science Congress opened at Benares on Monday, January 12. Dr. Forster will be remembered as Director of the Salters' Institute and President of the Chemistry Section of the British Association. The concluding portion of the address will appear in our next issue.

Experiment the Foundation of Science

THE fundamental principle of a scientific training which distinguishes it from the systems of classical instruction is experiment. The outstanding mental advantages to be gained by such training are (*a*) cultivation of the observational powers, (*b*) the art of deduction, (*c*) linguistic precision, (*d*) appreciation of Nature and (*e*) understanding of truth. The last-named is incomparably the most important of these, because health, happiness, prosperity and civil harmony have their common foundation in honesty—honesty of purpose, word and deed. No country can afford to neglect the teachings of modern science, but a country standing so close to Nature as does India, where man is alternately threatened with flood, famine, and disease or lulled to languorous idleness by beautiful scenery, a splendid flora and the passive contemplation of historic ages—such a country exposes herself to unnecessary physical risks and denies herself vast opportunities of spiritual development by remaining indifferent to modern revelation.

The reluctance of enlightened peoples to embrace the experimental method in their educational system calls for some explanation. The whole purpose of education is to provide the mental equipment and the principles of character necessary to self-development of the individual, so that the discipline of life may be accepted with courage and the opportunities of living may be enjoyed with self-restraint. Life itself is the greatest and most complex of all experiments, and yet, in our preparation for it, the vast majority are allowed to reach maturity untouched by experimental teaching. We are thrown into deep water without having learned to swim, and although some people acclaim that method as best calculated to produce good swimmers, the casualties are surely entitled to question the validity of the hypothesis.

Probably this reluctance to place ourselves in contact with current facts arises from the natural indolence of which we are all, in varying degree, the victims. It is so much easier to read than to write; so much easier to be carried than to walk; so much easier to receive than to give. Thus it has come about that a studious habit and a retentive memory have clothed with a mantle of reputed scholarship many a man who could not give a truthful description of the air he breathes, the water he drinks or the food he eats. One of the most pathetic moments in my life occurred when a distinguished scholar and cultivated wit, rightly welcomed by the "best people," sorrowfully confessed that he had not the faintest idea what happens when an electric light switch is pressed.

Ancient Learning and New Knowledge

Widespread adherence to ancient learning is not a monopoly of any hemisphere, and another more creditable factor in the common mistrust of experimental methods may be recognised in the proper reverence which we all must bear to those countless predecessors whose thoughts and actions have entitled them to the respect of posterity. No truly scientific man would allow himself to ignore or belittle those great writers and thinkers who, in conjunction with their disciples, have transmitted a splendid intellectual heritage for our enlightenment; these men, whether named or nameless, are rendered immortal by their spiritual bequests. All that we ask—and we ask it for the benefit of our fellows and of our successors more than for our own advantage—is that a balanced view may be taken of knowledge in its various branches. Nothing can diminish the importance of the past—excepting a slavish obscurantism; the most enlightened homage which we can offer our predecessors, the best form of gratitude we can show for the knowledge that they made, is to follow their example by making fresh knowledge.

Herein lies the potential value of science to the State, because it is by the experimental method of studying natural science that the mind most rapidly and surely learns to distinguish between fact and fable. Adoption of scientific training as an instrument of general culture is more important to the State than multiplying the number of those who intend to practice a branch of science as a means of livelihood; the elements of chemistry and physics, rightly taught, may become the foundations of civic virtue. Honesty and cleanliness among enlightened peoples are axiomatic: they are inculcated by a study of chemistry and physics, because it is impossible to conduct sound experimental work in these branches of science independently of those principles. More time is wasted by dirt and dishonesty than by any other social vice, because dirt is a common precursor of disease, and the circumvention of potential dishonesty demands the services of numberless healthy and intelligent people who might be so much more productively employed. The profession of stable-door locking, civil, naval, and military divisions, comprises the cream of the world's physique and a large proportion of its brightest brains: if these forces could be directed towards alleviation and prevention of tropical diseases, or the utilisation of solar energy, for example, a dazzling prospect would unfold itself, and their present misdirection becomes a proportionately dismal tragedy.

Scientific Spirit Not a Surrender to Materialism

Embracing a system of experimental training will not greatly assist India or any other nation, however, unless we are willing to assimilate the results in our outlook on life. So far from being a polite accomplishment to be paraded or screened from view as occasion demands, so far from being a fashionable veneer assumed in anticipation of commercial advantage, the best results of this training should find embodiment in the commonplace actions of everyday life, thus engendering an attitude of mind impelling its possessor honestly to attempt an accurate evaluation of ordinary occurrences and human relationships. No mistake could be greater than to suppose that the adoption of such a mental attitude is a surrender to materialism; its real aim is neither more nor less than sanity—soundness of mind and body. Common sense is attainable by a mind which has thoughtfully ranged the proportions of Nature. Acknowledging of necessity that man cannot grasp the immensity of astronomical distances or conceive the minuteness of an electron, a frequent survey of the firmament and a daily contemplation of the atom cannot fail to imbue the scientifically trained mind with a spirit of deep humility and reverence. Furthermore, such a mind is capable of acquiring more definite appreciation of actualities than one to which the firmament is merely a grand sidereal spectacle, or in which the subdivision of matter has not proceeded beyond the limits of a dust grain.

Humility still more profound and reverence even more sincere must permeate the reflections of those who bring scientific method and experimental resources to a study of the manifestations which distinguish living creatures from the elements of which they are composed. Imperfect as our knowledge and understanding of these manifestations must ever remain, clumsy as our efforts to unravel these mysteries must ever appear, they have nevertheless brought mankind to the threshold of a shrine which, to recognise, is most humbly to worship. To my mind, no actions can be more intrinsically religious than those revealing the wonders by which we are surrounded, so bringing us and our fellows to a more intimate understanding of, and consequent veneration for, the complex and beautiful system in which we are scarcely recognisable units. Man approaches more nearly to his origin, and brings with that approach a deeper conception of his own relative unimportance, by these patient attempts to dissect the chemical mechanism of his own and other animal bodies, of plant life and of the microscopic objects which support him or which prey upon him in uncounted myriads.

A Genuine Miracle

The members of this assembly are fully competent to supply illustrations of the foregoing principle; I will mention only one of the many which appeal to me. A single cubic millimetre of human blood has a living population approaching that of the

State of Mysore. The red corpuscles forming the vast majority of its inhabitants are bodies of great chemical complexity, and busily wear out their lives in the service of the body politic by conveying oxygen to the tissue cells. Associated with them is a relatively small number of white corpuscles, the policemen of the blood, foe engulfers, capable of producing proteolytic enzymes which kill and digest the enclosed alien. The medium in which these two classes of inhabitants exert their activities, known as the plasma, carries the food materials required by the living cells, comprising proteins, amino-acids, carbohydrates, fats and mineral salts, together with some of the necessary oxygen; it also receives the waste products thrown off by the cells in the shape of ammonium carbonate, urea, urates, xanthin bases, creatin and smaller amounts of other carbon compounds. Whilst the corpuscles have shape observable under the microscope, the unit mass of their active constituent, hæmoglobin, is molecular in size, but is nevertheless a definite chemical entity, sharing with the free moving and simpler molecules already mentioned the distinction of individuality which, to the chemist, is just as real and clearly defined as that of the personalities which he, as a human being, encounters during social intercourse or in his general reading of books and newspapers.

This microcosm, our cubic millimetre of blood, will also contain a few thousand molecules of hormones, products of the ductless glands, of which adrenaline and thyroxine have already been recognised as definite entities. We are now being led, however, into a field of complications embracing the problem of immunity, and, rather than weaken the illustration, it is better to remind ourselves that all the millions of the above specified molecules are suspended or dissolved in the necessary millions of water molecules, and that the cubic millimetre, with its myriad contents, must be multiplied by about five millions to provide enough blood for the vascular system of a normal man. It is on the maintenance of a physico-chemical balance amongst these millions of millions of individuals, a balance unimaginable by the most experienced physicist or chemist, that the indescribable blessing of "feeling well" depends. Is not this a genuine miracle?

Insulin

A glimpse of the discriminating mechanism by which this miracle proceeds during the span of healthy life has been lately accorded by the study of insulin. Those who desire to inform themselves concerning this material should read the address delivered by Mr. F. H. Carr to the Annual Meeting of the Society of Chemical Industry at Liverpool on July 11, 1924; it is dramatic in every implication of the narrative it unfolds, and is rendered the more effective by simplicity of language. From this address it becomes plain that the symptom of *diabetes mellitus* which characterises the disease—namely, excessive percentage of sugar in the blood, arises from failure by the pancreas to supply the amount of insulin required for destroying the sugar (glucose). This amount is extremely small, the most concentrated insulin hitherto produced being able, within two hours, to transform 30,000 times its own weight of sugar, behaviour which groups it with those catalysts most familiar to organic chemists, the enzymes. Thus, administration of insulin to a diabetic patient brings rapid relief by removing excess of glucose from the blood; but conversely, doses too generous may cause death, and a normal pancreas actually contains a lethal amount. From the fact that in health neither sugar nor insulin offers any inconvenience—one of the numerous factors in the above-mentioned physico-chemical balance—it follows that a rise in the proportion of blood-sugar, or some associated condition, so affects the release-control of the insulin store as to liberate the contents in quantity sufficient, but only sufficient, to bring the percentage of blood-sugar once more on a level of toleration. Thus the cause of diabetes may be either failure of the pancreas to produce the insulin, or some fault in the pancreatic mechanism of insulin release.

The importance of this discovery is not confined to the hopeful prospect of relief offered by its application to alleviating a dangerous and distressing malady. By depicting so clearly the physico-chemical process upon which one health factor depends it points the way to establishing others. It ranges itself with the better known, preliminary stages of the digestive process by attaining the dignity of a chemical response to a chemical stimulus. It defines another link in the chain of chemical events, amazing in their differential simplicity and equally amazing in their integral complexity, which unceasingly proceed within each one of us and within every living creature.

Ten Commandments and a Microscope

Although this integral complexity is beyond human comprehension, the differential simplicity is of an order well within the grasp of an average intelligence endowed with modest experimental equipment. What objection to supplying this equipment can there be? Implanted in every normal human child, growing or grown-up, is a thirst for mystification. The word "mystery" has acquired several meanings—namely, a secret doctrine; anything very obscure; that which is beyond human comprehension; anything artfully made difficult. It may thus connote good elements or bad, and one of life's tragedies rests in the fact that the great majority are allowed to mystify themselves with bad mysteries, dusty cobwebs of the mind, or rotting fruits of ignorance, while hundreds of good, wholesome, stimulating and enlightening mysteries, everywhere making contact with our daily lives, are encountered with stony indifference and not even recognised as mysteries, bad or good. It should be the aim of every education system, religious or secular, so to equip young men and women that they may be able to acquaint themselves with some of these good mysteries, closer examination of which would provide excitement much more wholesome and cultivation much more discerning than the distraction of "the pictures" and the receptivity of "listening in." True religion has a splendid ally in modern science: if required to define the minimum religious equipment for a boy or girl I should suggest, in all reverence, the Ten Commandments and a microscope.

The Gospel of Scientific Truth

Is it not our duty, individually and collectively, to spread this gospel of scientific truth and beauty? You, members of the Indian Science Congress, if you really are in earnest, can do it so much more effectively than any Englishman. You are the leaders of scientific thought and activity in this country; in your hands and in those of your acolytes rests the scientific future of India. You are justly proud of your wonderful country, the land of high-speed photosynthesis. You seek self-expression, but hitherto you have left mainly to others the delicate and baffling task of adjusting your incomparable territory to the growth of knowledge. Here and there, gallant examples of scientific achievement by Indian investigators have become entitled to the highest respect of the West: here and there, noble benefactions for the furtherance of scientific study have been made. The contribution of India to the progress of natural knowledge, however, is disproportionate to her splendid resources, intellectual and material, and the deficiency is not attributable to the tyranny of British rule. It is noteworthy, in fact, as a general principle, that rulers and rabble sin against science far less by active persecution than by passive neglect. Galileo might have pursued his astronomical observations unhampered by Inquisitorial attention had his mercurial temperament not led him to overstep the limits of controversial sobriety; it never has been considered good form to make fun of a Pope, but to do so in the seventeenth century was asking for trouble. Neither the Birmingham rioters who mobbed Priestley nor the revolutionary tribunal who decapitated Lavoisier took the slightest interest in phlogiston; it was the revolutionary sympathies of Priestley which enraged the anti-revolutionary scum of Birmingham, and the anti-revolutionary tendencies of Lavoisier which infuriated the revolutionary cut-throats of Paris.

Non-Ferrous Metals and Alloys

We have received from Kynoch, Ltd., and the King's Norton Metal Co. (constituent companies of Nobel Industries, Ltd.), a copy of *The Witton Book of Non-Ferrous Metals and Alloys*. Whilst touching very briefly on the historical and manufacturing side of the subject, the question of quality, testing and specifications is dealt with at some length. The book should be of interest to manufacturer and user. At the end are to be found a number of tables dealing with the weights of various non-ferrous metals in the different forms of strip, sheet, wire, rod, and circles. A copy may be obtained from the publishers, Kynoch, Ltd., Witton, Birmingham, by mentioning The Chemical Age.

Oil and Colour Chemists

Stream Line Filter Demonstrations

THE greater part of the meeting of the Oil and Colour Chemists' Association, held at the rooms of the Chemical Society, Burlington House, Piccadilly, on Thursday, January 8, was occupied by a demonstration and explanation of the latest developments of the Hele-Shaw Stream Line Filter. (Some of these recent developments have already been dealt with in an article in THE CHEMICAL AGE of August 30, 1924). Samples of Malay gums were also exhibited. It was intended, in addition, to exhibit Premier Mills, but, owing to a misunderstanding as to dates, the representative of Premier Mills, Ltd., was not present.

At the outset reference was made by the PRESIDENT (Dr. H. H. Morgan) to criticisms made against demonstrating particular apparatus at the meetings of scientific bodies, on the ground that it constituted an advertisement for the firm whose apparatus was exhibited. He pointed out that it was the object of the Association to disseminate useful knowledge to the members of the industry, and that if, in so doing, they benefited some particular individual or firm, that need concern them little.

Recent Improvements in the Filter

Mr. J. H. PICKARD (of the Stream Line Filter Co., Ltd.) demonstrated and explained the improvements made in the filter since he brought it to the notice of the members of the Association a year ago. As the result of several suggestions made on that occasion, he was now able to demonstrate the filtration of liquors in which the proportion of suspended solids was high, and where it was desired to obtain the solids in a dry and pure state, whereas, on the previous occasion, he only dealt with liquors in which the quantity of suspended solids was low.

One of the most important improvements made in the filter since Dr. Hele-Shaw first exhibited it is that, instead of the filter papers being square, with holes punched in them at regular intervals over the surface, the packs are now narrow strips of papers punched with holes (as illustrated in the article referred to). These packs lend themselves readily to the construction of filters of various types, particularly filter presses and suction filters. Though the principle of operation of the filter remains the same, modifications and improvements have been made in such details as the feed, outlet of filtrate, and method of removing the cake after the operation is completed.

In the construction of suction filters (in which the filtering units are the same as in other forms), different papers, compressed more or less tightly, are selected, in accordance with the filtration to be carried out, and filter frames may be arranged to enable the filters to operate either continuously or intermittently. An experimental rotary self-cleaning suction filter was exhibited, in which eight packs of filter papers are mounted on a central hub, through which the filter is connected to a vacuum. The wheel on the hub, of which the filtering packs form spokes is rotated into the liquor to be filtered, and from time to time the rotation is stopped to enable the solid content to be removed from the packs by blowing with compressed air.

Mr. Pickard said he believed it is the usual practice at present to separate pigments chiefly in filter presses after washing by decantation, and that the use of automatic filters has not been applied to any very great extent. It would appear, however, that the Stream Line Filter gave the opportunity of dealing with these very fine and difficult-to-wash precipitates in a much more expeditious and straightforward manner. Adopting an automatic self-cleaning vacuum filter, a first filtration of the pigment could rapidly be made from the mother liquor, and washing in the process was practicable, at all events to some extent. If this washing were not sufficient, it would be a relatively easy matter to pulp the pigment again and re-filter without the necessity of waiting for it to settle, and even a double filtration would be a great saving in time over what was necessary at present for the long settlings and decantations employed.

New Type of Laboratory Filter

Passing from the large-scale models to laboratory experiments, Mr. Pickard exhibited a new type of laboratory filter, with which the Stream Line Filter Co. is now replacing its original laboratory type. Several improvements have been introduced, and it is now possible to use it very largely as a quantitative instrument. Provision is made for the pack to be opened to view during filtration, so that the operator can see whether everything is proceeding normally. Further, by means of a graduated spring head, the compression which is actually applied to the pack can be directly read off in pounds or kilograms, and thus the conditions can be repeated at any time with exactitude. Moreover, if the conditions of any given filtration are determined and sent to the company, this information enables them to design a large-scale filter to work under the same conditions. Pressures varying between 0 and 240 lbs. can be applied. Other features of the filter are the ease with which the separated solids can be recovered, it being merely necessary to remove the caps at the top and bottom, when the whole of the interior is exposed to view; also, the readiness with which the filter can be cleaned, there being no awkward corners or inaccessible curves. The method of supplying the liquid to the filter has also been altered. With the previous model a pump was placed centrally in the pack, but it has been found better to substitute a separate pressure vessel and montejus, through which the liquid is forced by compressed air applied by a bicycle pump. This enables the action of the filter to go on continuously for considerable periods without any attention from the operator. The montejus is adapted for pressures up to 200 lbs. per sq. inch. The pressure vessel is particularly convenient when slow filtrations have to be carried out, but when fairly freely filtering liquors are in question it would be laborious to open and re-charge the montejus every few minutes. For these cases a pump is supplied, capable of conveying liquor to the filter up to half a litre per minute, or 7 gallons per hour. The filter paper in the case of the laboratory model consists of a pack of discs of paper with a large central hole.

Another feature of the filter generally is that, by varying the class of paper used, it has been found possible to grade the size of particles in the resulting cake.

During the evening, Mr. Pickard successfully filtered oxide of iron solution and Prussian blue, which had been sent him by members of the Association.

Discussion

Mr. W. J. PALMER said that, by the ordinary methods hitherto available, it was not possible to filter the materials used in the paint and varnish industry to an extent which gave more than 30 to 35 per cent. of cake, although 20 per cent. would be regarded as a satisfactory result. In the case of certain colours, however, which he had sent to Mr. Pickard, including prussian blue, and with which he had never been able to obtain more than 27 to 33 per cent., the solids obtained by the Stream Line Filter, to his surprise, amounted to 40 per cent. Similarly, in the case of iron oxide he had tried every conceivable means in the laboratory, without success, to obtain a water-white filtrate, but within 24 hours Mr. Pickard had succeeded in doing this, and it was only to be hoped that the process could be applied on the works scale.

Professor J. W. HINCHLEY, after pointing out how the original defects of the first Stream Line Filter had been removed by new designs, expressed disappointment that the Premier Mill people had not exhibited their apparatus, as originally intended, because he looked upon the Stream Line Filter as a sort of necessity to the colloid mill for the ultimate development of that machine. The best pigment was that with the finest particle, and it was possible that by a combination of the Stream Line Filter and the colloid mill better pigments could be provided without extra cost. Dealing generally with the operation of the filter, he pointed out that in working these experimental filters it was desirable that the actual pressure on the paper should be carefully adjusted to suit the pressure of filtration, and that the higher the pressure of filtration the higher the pressure on the paper. In the case of his own experiments, the pressure on the paper was about 70 per cent. of the pressure of filtration, and under these conditions the finest results were obtained. His experience had been that 9 out of 10 experimentalists had failed to work the filter at all in the first instance, through lack of understanding of the principles involved, and yet these same men, of considerable scientific attainments, were able to make the filter work absolutely successfully the moment its working had been explained to them. The developments

now going on were a marked step in the direction of the practical application of the filter on a large scale, which would be extremely useful in the pigment industry. He did not know how far the filter had been used for concentrating the concentrations obtained from such mills as the Premier colloid mill, but it seemed to him that its value in that direction ought to be very great.

Mr. W. G. ASTON said that, from the results obtained with some samples he had sent to Mr. Pickard, there was no doubt as to the work which could be done with the Stream Line Filter. His chief concern now was as to the extent to which it would be applicable on the manufacturing scale. He understood that there was very little likelihood of the strips of paper breaking through, and, in that respect, there would be a great advantage over the filter cloth. One other point was that, whereas Mr. Pickard had spoken of thin films of cake, the colour trade rather desired to have substantial cakes, say, of 1 inch in thickness. There were certain pigments which it was almost impossible to deal with by ordinary filter presses, and it seemed to him that the Stream Line Filter would certainly solve a great many of the difficulties hitherto encountered.

Mr. NOEL HEATON congratulated the Stream Line Filter Co. on having adopted, in its latest designs, the suggestions made on the last occasion when the filter was before the Oil and Colour Chemists' Association.

Mr. PICKARD, replying on the point as to thin and thick cakes, said that in the continuous filter the cake was continuously removed and could be put into the drying ovens in bulk, and not in the thin cakes as removed from the filter. Thus, there would be no need for a greater area of drying shelves or anything of that sort. If the conditions of filtration were adhered to, there should be no breaking through, a point referred to by Mr. Aston. If the ratio of about 70 per cent., mentioned by Professor Hinchley, was exceeded, then breaking through between the sheets did happen, but this was not likely to be the case under practical conditions. As to what would happen if solid material got between the sheets of paper, this should not happen in the ordinary way, because the filter packs were sent out under a certain pressure, which the workmen could not alter. If, on the other hand, solid material did get between the sheets, it certainly was a nuisance, but it could be washed out, and the pack need not be scrapped, although, perhaps, the results afterwards might not be so good. The washing of the precipitate, mentioned by Mr. Noel Heaton, was perfectly simple.

Malay Gums

Mr. HEDLEY BARRY exhibited a series of specimens of Malay gums which have been presented to the Association by the Conservator of Forests to the Malay States, and suggested that members of the Association should obtain samples of these gums and make a start on accumulating data concerning their properties.

The PRESIDENT mentioned that he had examined some of these samples a year or two ago, and had found them extraordinarily good, but the difficulty was to be able to obtain these gums except as samples.

Mr. BARRY replied that arrangements had now been made with a special London agent for the sale of these gums, carrying the Malay States Government guarantee. One of the complaints of the Malay States Government was that gums carrying their guarantee had been mixed with inferior gums, and sold under the original title, although, of course, the guarantee had been removed.

International Advertising

UNDER the title of the "World Wide Wedge" the Dorland Agency, Ltd., has issued a compact little volume on International Advertising. The book describes the media in every country in the world. The information is selective and presents a concise view of the facilities offered in every country. The book also contains all the publications of the United Kingdom listed together with tabulated information on their circulations, their rates, and mechanical requirements. It is published at 5s. net from the offices of the Dorland Agency, Ltd., Dorland House, 14, Regent Street, London, S.W.1.

Society of Chemical Industry

A Paper on "The Melting Point of Coal Ash"

AT the meeting of the Manchester Section of the Society of Chemical Industry held on Friday, December 9, Mr. John Allan presided, and a paper on "The Melting Point of Coal Ash, Part 2," was read by Messrs. N. Simpkin and F. S. Sinnatt.

MR. SIMPKIN said that the present paper was a continuation of the work described by the authors in conjunction with Mr. A. B. Owles (*J.S.C.I.*, 1923, 42,266T.). In that paper a simple apparatus was described for determining the melting point of coal ash. This apparatus had been modified so that determinations could be carried out in any type of atmosphere, either oxidising or reducing. Experiments showed that determinations performed in a reducing atmosphere gave very different results from those obtained in an oxidising atmosphere, and in this respect a mixture of 50 per cent. hydrogen and 50 per cent. steam yielded the most pronounced effect, the melting point being lowered in some cases by as much as 250° C. This was of importance in view of the fact that in certain industrial plants, e.g. water gas plants, the coal during combustion was subjected to a reducing atmosphere. It became important, therefore, to determine not merely the melting point of an ash in air but the lowest temperature at which an ash would melt as exemplified by a reducing atmosphere.

It was common practice to blend coals for certain purposes. Starting with two coals whose ashes melted at different temperatures, it had been shown that by blending the coals in different proportions, the resulting ash might melt (*a*) either above the melting point of both, (*b*) below both the melting points, (*c*) between the two melting points. It was not possible, therefore, to foretell from a knowledge of the two melting points alone at what temperature the ash of any blend of two coals would melt. This work had considerable bearing upon pulverised fuel installations where, owing to previous grinding, the ash particles were in intimate contact.

Properties of a Catalytic Surface

PROFESSOR HUGH S. TAYLOR, of Princeton University, U.S.A., in a paper on the "Properties of a Catalytic Surface," stated that active catalysts were characterised by a high ratio of surface to mass. The surface manifested high adsorptive capacity of a definite type. The adsorption was not capillary but was specific and chemical in nature, as was evident from the high heats of adsorption which accompanied the process of adsorption. In such specific adsorption the catalyst surface was generally rapidly saturated at low pressures of the gaseous adsorbate, and the adsorption varied little with further increase of pressure. The catalyst surface was extraordinarily sensitive to heat treatment, changes in the surface being detectable 1,000 degrees below the melting point of such a catalyst as copper. Such changes in surface were readily followed by adsorption measurements which constituted an extremely delicate method of studying the "sintering" of materials. Poisons inhibited the adsorption of reacting substances by catalysts, and, to a still more marked degree, the reactivity of such substances at the catalyst surface.

Surface alone was no sufficient condition for the production of an active catalyst. High activity was achieved by the presence, in the surface, of atomic or molecular units or groups more or less detached from the normal lattice of the material, unsaturated by the normal forces operating in such lattice formation. It was at such detached centres that catalytic activity was manifest, the more intensely the greater the unsaturation of the centre. This agreed with recent observations in non-catalytic work, for example, the extremely high heat of adsorption of oxygen on charcoal (200 Kg. cals. Garner) and other thermal data. It was in accord with the fact that minute quantities of poisons inhibited catalytic changes, and that poisoning might be progressive; that was, a catalyst might be poisoned for one reaction and retain activity for another less difficult catalysed reaction. It suggested a reason why minute amounts of "promoters" had such an extraordinary influence on catalyst activity, and offered a theory for the problem of specific catalytic effects.

Chemical Trade Returns for December

Imports Increased: Exports Decreased

THE imports of chemicals, drugs, dyes, colours, etc., for December show an increase over the figures for December, 1923, of £123,383, the figures being £1,200,229 and £1,076,846. Exports, however, show a decrease of no less than £201,243, the value for December being £2,053,714, as against £2,254,957 for December, 1923.

In both sections several important changes are to be noticed. In imports perhaps the most important increase is sodium compounds (other than nitrate), where the figures read 89,847 cwt., as compared with only 10,851 cwt. in December, 1923. Appreciable increases are to be observed in the case of essential oils, potassium nitrate and alizarine dyestuffs. The most important decreases are glycerin, from 7,245 cwt. to 326 cwt., and sodium nitrate, in which case the figures have been halved.

In the exports the most significant change is the increase in the figures for tar oil, creosote oil, etc., from 3,527,015 galls. to 4,921,956 galls. There has been no export of anthracene compared with 220 tons last year, and benzol and toluol have dropped from 527,894 galls. to 6,118 galls. Coal tar dyestuffs have decreased by more than half.

Imports for December

INCREASES.	1924.	1923.
Acid, acetic ....tons	907	369
Acid, tartaric ....cwt.	1,932	1,579
Bleaching materials .... ,,	4,120	3,158
Calcium carbide .... ,,	97,250	61,573
Sodium compounds, except nitrate .. ,,	89,847	10,851
Zinc oxide ....tons	643	392
White lead....cwt.	13,451	9,613
Unspecified painters' colours .... ,,	65,112	46,106
Essential oils, except turpentine....lb.	417,893	374,472
Potassium nitrate....cwt.	17,428	3,802
Cream of tartar .... ,,	4,227	3,419
Intermediate coal tar dyes (including aniline oil and salt, and phenyl-glycine),,	133	14
Alizarine dyestuffs .... ,,	996	298
Synthetic indigo.... ,,	—	—
Natural indigo .... ,,	93	47
Unspecified coal tar dyestuffs .... ,,	1,937	1,502
Barytes, including blanc fixe .... ,,	63,080	42,963
Turpentine .... ,,	55,498	31,919

DECREASES.	1924.	1923.
Glycerin, crude ....cwt.	326	7,245
Glycerin, distilled .... ,,	112	350
Nickel oxide .... ,,	1,598	3,418
Potassium compounds, except nitrate ,,	567,295	610,772
Sodium nitrate .... ,,	32,365	62,130
Mercury .... lb.	132,303	221,732

Exports for December

INCREASES.	1924.	1923.
Ammonium sulphate ....tons	24,594	22,689
Bleaching powder ....cwt.	36,503	21,616
Carbolic acid.... ,,	11,190	6,131
Tar oil, creosote oil, etc. ....galls.	4,921,956	3,527,015
Unspecified coal tar products ....cwt.	39,701	30,104
Glycerin, crude .... ,,	12,722	3,993
Glycerin, distilled.... ,,	12,929	12,922
Potassium chromate and bichromate . ,,	3,875	3,646
Caustic soda .... ,,	129,991	126,557
Sodium chromate and bichromate.... ,,	5,934	4,285
Paints and colours ground in oil or water .... ,,	31,583	28,608
Painters' colours, etc., unspecified... ,,	43,716	37,369

DECREASES.	1924.	1923.
Acid, tartaric ....cwt.	1,044	1,786
Acid, sulphuric .... ,,	2,113	5,532
Ammonium chloride ....tons	332	554
Anthracene .... ,,	—	220
Benzol and toluol ....galls.	6,118	527,894
Naphtha .... ,,	5,310	85,719
Naphthalene ....cwt.	1,182	10,189
Copper sulphate ....tons	757	2,176
Potassium nitrate (saltpetre) ....cwt.	1,188	1,542
Unspecified potassium compounds .. ,,	2,141	4,212
Sodium sulphate, including saltcake . ,,	155,117	178,831
Sodium carbonate, etc. .... ,,	448,891	591,549
Unspecified sodium compounds..... ,,	44,944	47,820
Zinc oxide ....tons	150	247
Coal tar dyestuffs ....cwt.	5,854	12,934
Dyestuffs, except coal tar .... ,,	3,784	6,552
Painters' colours, etc., prepared ..... ,,	25,187	29,649
White lead .... ,,	14,145	21,670
Barytes, including blanc fixe ..... ,,	1,642	6,376

The Tar Products Industry

To the Editor of THE CHEMICAL AGE.

SIR,—Your Editorial note, published under this heading in your last issue, comes at an opportune moment. At this time last year the patent fuel industry was menaced by the uncontrolled use of coal tar pitch in roadmaking. As a result, several patent fuel works had to close down and are still partly or wholly closed down, almost entirely on account of the uncertainty due to a repetition of the violent fluctuations in pitch prices, which nearly ruined the industry during the last two years and have actually caused works to go into liquidation recently.

You are right in stating that the patent fuel industry in South Wales sees signs of renewed life in the present reasonable price of pitch, and it is generally accepted that several works would reopen if any reasonable undertaking were forthcoming that the price of pitch for briquetting would be kept below 100s. per ton for six or twelve months. Without it, the risk, having regard also to the uncertainty in the price of anthracite duff, etc., is too great, and you, sir, would be rendering yeoman service by inviting correspondence from all parties concerned with a view to a solution of the present difficulty.

Failing co-operation, the remedy lies in the finding in whole or part of a substitute for pitch in briquetting practice, and I am aware that during the last decade much effort and money have been lost in the pursuit of this idea.

During the last year, however, my colleagues and myself have been engaged upon the development of a universally available vegetable binder with highly successful results. Arrangements are in progress for making some thousands of tons of briquettes in South Wales, and bulk tests have already shown that as little as 2 per cent. dry weight of this binder will make satisfactory briquettes at a cost for binder of less than one-half that with pitch at its present low price. I must add that it is unlikely that this or any other binder will completely displace pitch in the patent fuel industry because, for certain purposes, completely waterproof briquettes are required, whereas with the new binder, although it is not soluble in water, only a reasonable degree of waterproofness is obtainable without additional expenditure. The principal field for the new binder lies in the Colonies and in the production of smokeless fuel from anthracite and semi-coke, and by its use the very objectionable features of pitch, when used with anthracite in slow combustion stoves, should be obviated.

It is to be hoped that this letter will do something to check any tendency during the coming season for repetition of the undesirable rise in price of pitch, which proved so disastrous to all concerned, and that it will revive interest in the very important British patent fuel industry, particularly in connection with recent anthracite development for Canadian and other markets. Although pioneers, we are now lagging behind in the briquetting field, and the pitch question has been largely responsible.—Yours, etc.,

C. J. GOODWIN.

7 and 8, Idol Lane, Eastcheap,
London, E.C.3.
January 12.

A Catalogue of Fine Chemicals

COMPILED and set out with a thoroughness which makes it almost a reference book, the 1925 catalogue of fine chemical products, published by British Drug Houses, Ltd., Graham Street, City Road, London, includes not only organic and inorganic chemicals but analytical reagents, indicators, and standard stains. Sections are also devoted to aniline dyes and minerals.

Germany's Chemical Industry

INTERESTING details of the state of the chemical industry in Germany are revealed in a Department of Overseas Trade report from Berlin.

Owing to the favourable weather, sales in the potash industry in December were better than was expected at that time of year. No special recovery of foreign trade was recorded. In spite of the better sale conditions since August last, the average sales for the year were not large enough to admit of a thorough improvement in the difficult position of the potash industry being recorded.

In the chemical industry the position remained unaltered during December. The revival on the glass chemicals market was maintained, while the demand for fine chemicals, both on the part of the consumer and also on the part of the dealer, was still very restricted, owing, as before, to the unfavourable financial position of the German laboratories.

The inland demand for porcelain and stoneware was fairly lively, and employment in the factories was consequently rather brisk. Foreign trade declined further in view of the import restrictions abroad and lower foreign prices. The position of the electro-technical porcelain industry remained unfavourable. The East Prussian cellulose industry was satisfactory during December and, in part, very brisk, but the competition of the Scandinavian factories was much felt.

Chemical Workers' Wages

THE National Drug and Chemical Union announces that after many months' negotiation and ballot of members it has just concluded a new agreement with the Drug and Fine Chemical Manufacturers' Association (which includes most of the important firms in the country) operative on and from January 1 last. The agreement embodies for the first time a complete list of definitions for all skilled and semi-skilled workers in the trade. The new grading under this agreement will improve the conditions of the bulk of workers concerned, particularly men at the age of 21 years, many of whom will receive increases in wages of from 15s. to 23s. per week. Mercury workers and assistants will receive 4s. per week above grade rates, apart from changes due to new grading.

Women workers in the trade benefit even more than the men. Fillers of poisons, those engaged in special work not usually performed by women, and those engaged in washing heavy stone or drum work are to receive extra pay. For piece-workers the new rates will be arranged between the workers' representatives and firms to produce not less than 25 per cent. above time rates.

Clogs, overalls, dust caps, etc., will now be definitely provided by employers. Auxiliary workers in the trade, watchmen, clerks, maintenance, and transport men are now accounted for in the agreement.

Benn Brothers' Staff Ball

THE staff ball given by Benn Brothers, Limited (proprietors of THE CHEMICAL AGE), at the Hotel Cecil, London, on Friday evening, January 9, was a great success. The party numbered about 300, including members of the London staff, country representatives and invited guests. The visitors were received by Sir Ernest and Lady Benn, who were accompanied by Lady John Benn, the other directors, and members of the family. Dancing, for which the music was supplied by Mr. John W. Birmingham's band, began at 8 o'clock and continued until 12.30 a.m., in the Grand Hall. During the supper interval bouquets of flowers were presented by Miss Trimby, (of THE CHEMICAL AGE) to Lady Benn, and by Mr. W. Baldock, (who was associated in the early days of the firm with the late Sir John Benn as an artist) to Lady John Benn. Mr. J. A. Knivett, who is on the point of completing 25 years in the service of the firm, briefly expressed the thanks of the staff to the directors and commented on the intimate and friendly relations that existed between the management and the staff, which largely accounted for the continued prosperity of the business. Sir Ernest Benn, in responding, referred to the co-operative spirit in which the work of the firm was carried on and attributed their prosperity and growth to this spirit.

High Explosives

Sir Robert Robertson on Their Properties

THE properties of high explosives formed the subject of a lecture on Saturday, January 10, at King's College, London, by Sir Robert Robertson, director of explosives research, Woolwich Arsenal.

Referring to T.N.T., the lecturer stated that the rate of detonation of that substance was 20,000 ft. a second, which, if it could be imagined to be continued from London to Edinburgh, would arrive there in about one and a half minutes, or thirty-three minutes before the sound of the explosion could arrive. The fact that high explosives struck downwards, whereas others which were not so high struck upwards, was due to the rapidity with which the conversion into gas took place, there being no time in the case of the high explosive to lift the superincumbent mass of air, while the low explosive moved the air and did little damage to the ground.

Dealing with the mixture of explosives, he explained that nitro-glycerine contained a slight excess of oxygen, while gun-cotton had a slight deficit. When the two were combined in blasting gelatine, a very powerful explosive was formed. Another excellent mixture was amatol, which was used in large quantities in the war, as much as 4,000 tons a week being turned out. Amatol was composed of T.N.T., which had an excess of carbon, as shown in the black smoke produced by its explosion, and ammonium nitrate, which had an excess of oxygen.

Sir Robert warned his hearers against accepting suggestions that explosives might be employed for the driving of machinery. Self-contained explosives, like gunpowder, cordite, and T.N.T., developed only a fraction of the heat which was produced by the burning of petrol and similar substances in contact with air. They were violent, but extremely wasteful as sources of energy.

A New Laboratory Grinding Mill

WE understand that Christy and Norris, Ltd., of Chelmsford, have recently perfected and put on the market a small grinding mill for laboratory work. This machine is of very simple construction, the whole of the grinding being done by beaters revolving at a high speed. The whole front of the machine can be taken away by the removal of three nuts, and the removal of this front portion gives access to the whole interior of the machine, which can be cleaned out by brushing and washing, or by a steam jet, to ensure that it is perfectly clean, so that the next sample being ground for the laboratory test is not contaminated in any way. The range of materials that can be ground with this machine is very great, extending from materials similar to dry grass or hay to such hard material as barytes, and practically any degree of fineness can be obtained. The space taken up is very small, the most satisfactory drive being direct from a small high-speed motor. These machines have been on the market for over a year, and are being used by some of the largest and most important chemical manufacturers in this country. They are reported to be most satisfactory for dealing with a very large range of materials.

New Catalogue of Optical Apparatus

A REVISED general catalogue has just been issued by Adam Hilger, Ltd., of 75A, Camden Road, N.W.1, whose optical apparatus is well known. The catalogue is a substantial production, and it is divided into a number of sections, which are provided with thumb indexes for ready reference. The apparatus described in the various sections includes spectrometers, and their accessories, micrometers, spherometers, polarimeters, saccharimeters, photometers, colorimeters, and so on. Full descriptive matter is given in the catalogue, but no prices. Instead reference numbers are used for each article described, and in a list issued monthly the current prices will be readily found. This is an excellent idea when dealing with apparatus which remains unchanged from year to year, except for unavoidable alterations in prices. As a result the bound catalogue may be kept for reference, without any fear of its being out of date at any time. The latest monthly list, which will be forwarded to those who ask for the catalogue, always gives the current price of any article listed without any delay.

From Week to Week

A FACTORY FOR THE MANUFACTURE OF EXPLOSIVES is to be erected at Wharfdale Road, Tyseley, by Mr. John Roper, official authority having been granted.

A DINNER to celebrate the completion of 25 years' activities was held by Rigby, Taylor, Ltd., oil refiners and chemical manufacturers, of Bolton, on Thursday, January 8.

PROFESSOR JAMES F. NORRIS has been elected president of the American Chemical Society. He is Professor of Organic Chemistry at Massachusetts Institute of Technology.

FOR STEALING LEAD from the lining of a dismantled vitriol tank, the property of Chance and Hunt, Ltd., chemical manufacturers, of Ocker Hill, three men were sentenced each to six months' imprisonment.

HEAT TREATMENT BULLETIN, No. 34, issued by Automatic and Electric Furnaces, Ltd., of Elecfurn Works, 173/5, Farringdon Road, London, deals with "Production Hardening of Taps" and includes test tables and a graph.

BIRMINGHAM CITY COUNCIL has decided to give official recognition to the British Industries Fair to be held at Castle Bromwich next month. A sub-committee has been formed and an appeal for support from traders will be broadcast.

THE IMPORTANT SUBJECT of "Chemical Poisoning Occurring Amongst Industrial Workers" will be dealt with by Dr. Arnold Renshaw in an address to the Manchester Section of the Institute of Chemistry, on Monday, March 2. This meeting will take the place of the social evening arranged for March 12.

MR. E. R. PRESTON has resigned his appointment as managing director of the Goodyear Tyre and Rubber Co. (Great Britain), Ltd., and will return to the United States at the end of January. His successor is Mr. C. P. Skinner, who has for many years past been in charge of Goodyear interests in South Africa.

THE DECEMBER ISSUE of the *Journal of Scientific Instruments*, published by the Institute of Physics, has been enlarged to include descriptions of new instruments shown at the annual exhibition of scientific apparatus held on January 7 and 8 by the Physical Society of London and the Optical Society.

A NEW ENGLISH PROCESS for the manufacture of dyes is stated to be under trial at Antwerp where plant has been erected. One thousand tons of gold arsenical concentrates have been imported from Nova Scotia. Should the process prove successful, it is anticipated that a new industry will be set up in Nova Scotia.

HOWDEN-LJUNGSTROM PREHEATERS (LAND), LTD., of Glasgow, have received an order to supply three H-L air preheaters for the Inveresk Paper Mill, Ltd., Musselburgh. The total heating surface of these preheaters is to be 80,040 square feet; air will be supplied to the furnace at about 350° F. and 12½ per cent. saving in coal is expected.

PROFESSOR J. W. HINCHLEY, of the Royal College of Science and Royal School of Mines (Imperial College of Science and Technology), South Kensington, resumed his duties on Tuesday, after an absence, through ill-health, of over three months. Professor Hinchley was operated on on November 1 for an internal complaint, but is now thought to be completely recovered.

THE PUBLIC EXAMINATION of Walter Daniels, of 42, Haslemere Road, Southsea, washing soda manufacturer, revealed liabilities of £3,278 15s. and assets of £1,260 8s. 6d. The debtor attributed his failure to lack of working capital, disputes and litigation. The Official Receiver stated that the books were incomplete and unsatisfactory, and ordered an amended statement to be prepared.

EXPORT TRADE is unsatisfactory according to the annual report of the chemical and allied trades section of the Manchester Chamber of Commerce. It is stated that freight rates from Continental ports are in many cases less than half those charged from British ports. The importation of chemicals from Germany has been surrounded with difficulties, for owing to lack of capital many works have been shut or have been working short time. Other features which have acted as a deterrent are Reparation Duty, the operation of the Safeguarding of Industries Act, and the continuance of the import licence system.

MR. J. HANDS, for 14 years secretary and director of the Hockley Chemical Co., Ltd., Birmingham, has died at Malvern.

THE DEATH IS ANNOUNCED of Mr. Alexander Hamilton, managing director of the British Cotton and Wool Dyers' Association, Ltd., in his 82nd year.

AN OIL TANK EXPLODED at the Isle of Grain works of the Medway Oil Storage Co., near Sheerness, on Wednesday. Two men were killed and six injured.

A CYLINDER OF ACETYLENE GAS exploded at the works of Allen-Liversedge and Co., Birmingham, on Friday, January 9. Two workers, who were loading the cylinders, were injured.

THE ALIANZA CO. has bought out the Boquete Nitrate Co., Antofagasta, for £375,000, payable in cash. No increase of capital or issue of debentures in connection with this purchase will be necessary.

THE HURTER MEMORIAL LECTURE was delivered on Friday at Liverpool by Sir Max Muspratt, his subject being "Chemistry and Civilisation." A full report of the address will appear in THE CHEMICAL AGE next week.

EXPORTS OF POTASH FROM SPAIN are expected shortly as a result of developments of the Minas de Potassa de Suria by the Belgian branch of Solvay and Co. It is stated that the company intends to gain a footing in the American market.

OWING TO THE DANGERS of lead paint containing more than 2 per cent. of white lead, it has been decided to discontinue its use in the internal painting of buildings of the War Department when existing stocks of paint have been exhausted. The use of zinc paint is to be encouraged.

SIR WILLIAM HICKING, head of the firm of G. and W. N. Hicking, bleachers, dyers and dressers, of Nottingham, has acquired the lace bleaching, dyeing, and dressing works of Thomas Adams, Ltd., of Nottingham, which are said to be the largest works of the kind in the world.

A NEW MONTHLY JOURNAL for the textile trades—"Health, Welfare and Safety"—has been produced by J. Guthrie Oliver and Co., technical publishers, of 21, Houghton Street, Southport. The paper is well printed and contains articles of practical interest to the industrial employer and employee.

TWO PAPERS, one by Mr. H. L. Heathcote on "The Testing of Resistance to Tearing," and a joint paper by Messrs. D. F. Twiss and F. Thomas on "A Comparative Study of Some Vulcanisation Accelerators," were read at the meeting of the Birmingham and Midland Section of the Society of Chemical Industry on Tuesday.

SIR EDWARD A. BROTHERTON, BART., contributes an interesting survey of the progress in chemical industry to *The Yorkshire Post* Trade Review. He refers to the great possibilities of the sugar beet industry, and quotes as one of the most noteworthy inventions of 1924, Dr. Ewan's process for the manufacture of sodium from common salt.

THE ELIMINATION OF LEAD POISONING in the pottery trade was discussed at the annual meeting of the National Council of the Pottery Industry at Stoke-on-Trent on Wednesday. The use of raw lead, it was stated, was unnecessary. The substitution of low solubility glaze was, in the opinion of several speakers, a proved remedy, and as a further precaution a restriction in the percentage of lead allowed in the glaze was suggested.

Miss Shelagh Brunner's Wedding

As was anticipated the marriage of Miss Shelagh Brunner, daughter of Mr. and Mrs. Roscoe Brunner, to Prince Ferdinand Andreas of Liechtenstein, which took place at Brompton Oratory on Wednesday, was one of the most brilliant social events of the season. As both parties are Roman Catholics, full Nuptial Mass was celebrated, and the 700 invited guests had great difficulty in finding accommodation, so great was the public interest aroused. After the ceremony a reception was held at Claridge's Hotel, and later Prince and Princess Ferdinand of Liechtenstein left for Biskra.

Among the guests were noted—Sir John and Lady Brunner, Mrs. Godfrey Brunner, Mrs. Berbain Brunner, Mrs. Joseph Brunner, Mrs. Cecil Brunner, Miss Veronica Brunner, Mr Anthony Brunner, Mr. and Mrs. Emil Mond, Miss May Mond, Sir Max and Lady Muspratt, and Mr. and Mrs. G. Vaughan-Morgan.

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Abstracts of Complete Specifications

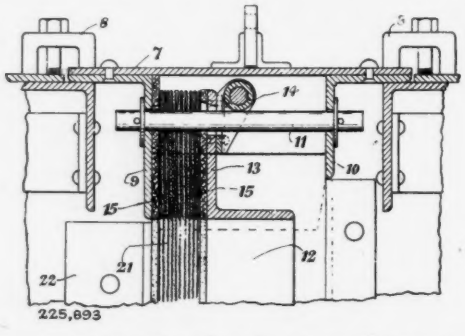
225,891. ACTIVATED CARBON, MANUFACTURE OF. H. E. Potts, Liverpool. From Naamlooze Vennootschap Algemeene Norit Maatschappij, 2, den Texstraat, Amsterdam. Application date, June 8, 1923.

The process is for improving activated carbon which is prepared by the action of heat on carbonaceous material in the presence of activating substances such as chlorides, sulphates, carbonates, acetates, nitrates, alkaline substances, acids, albumen solutions, steam, carbon dioxide, fluegases, chlorine, etc. In this invention a predetermined quantity of acid is added to fresh or regenerated carbon, and practically the whole of this acid is left in the carbon. The product may thus be acid, or it may be neutral since alkaline impurities such as potassium carbonate and lime are usually present and are neutralised by the acid. The carbon may be treated with sprayed or atomised acid, or heated and agitated with acid, or treated with acid gases. Hydrochloric acid is preferred, but sulphuric acid, nitric acid, acetic acid, phosphoric acid, tartaric acid, or sulphur dioxide may also be employed. The activated carbon is preferably treated by hydrochloric acid gas as it is cooling down after the activating process, and about 0·5–1% of acid may be left in the carbon.

It has been found that acidified carbon is particularly suitable for treating oils and fats, such as olive oil, cocoanut oil, rape oil, cottonseed oil, palm oil, palm kernel oil, soya oil, sesame oil, arachis oil, linseed oil, animal fats, or liquid fatty acids. The oil is sometimes treated with an alkaline carbon and subsequently with an acid carbon, and in many cases it is an advantage to over-saponify the oil or fat. Examples are given of the treatment of de-acidified rape oil in a partial vacuum at 80° C. with 2% of decolorising carbon impregnated with hydrochloric acid; and the treatment of de-acidified olive oil with 1 per cent. of carbon impregnated with sulphurous acid.

225,893. GAS FILTERING APPARATUS. F. H. Rogers, London. From O. V. Greene, 2201, East 95th Street, Cleveland, Ohio, U.S.A. Application date, June 12, 1923.

This apparatus is for filtering blast furnace gases and other gases obtained in metallurgical and other plant. The top of the casing is provided with a removable cover plate 7 secured by clamps 8 and provided with two flanges 9, 10, which support horizontal rods or bars 7. A rectangular framework 12 is



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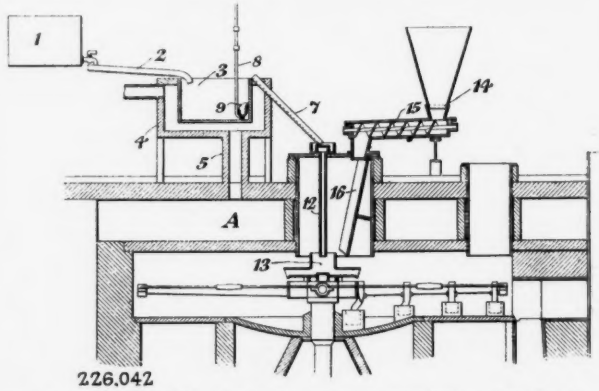
loosely supported by these bars by means of an angle plate 13 and bearing rollers 14, so that the frame may be moved horizontally. A series of woven wire screens 21 are mounted on the bars 11, and are pressed together at the edges against the framework 22 by means of the frame 12, so that the edges are sealed between the compressible pads 15. Suspended matter in the gas is intercepted by these screens, and the frame 12 is tilted away at intervals so that the screens may be jarred to detach the accumulated dust. It has been found that the dust which is met with in metallurgical gases varies greatly in its tendency to adhere together, and screens of much finer mesh may be used with non-adhesive dust. In this apparatus the dust is separated by baffling the gases so that the dust particles impinge on the screened surfaces and thus lose their velocity. The screens are prepared for use with very fine non-adhesive dust by means of a deposit of fibrous or cellular material. The screen is treated with sodium silicate and then dusted with finely ground asbestos or mineral wool, which forms an irregular fibrous coating.

225,944. RESINOUS COMPOSITIONS. The British Thomson-Houston Co., Ltd., Crown House, Aldwych, London, W.C.2. From the General Electric Co., Schenectady, N.Y., U.S.A. Application date, September 13, 1923.

The object is to render a natural aromatic gum infusible, and this is effected by heating it in the presence of formaldehyde. In the manufacture of moulded compositions, the gum may be mixed with a formaldehyde derivative such at hexamethylene-tetramine. The process is applicable to natural aromatic resins such as acroides gum and benzoin gum. In the case of acroides gum, 10 per cent. of hexamethylene-tetramine is added with or without a filler, and the mixture heated to 160° C., when the resin becomes infusible.

226,042. HYDROCHLORIC ACID AND SALT CAKE, PROCESS OF MAKING. C. A. Grasselli, Guardian Building, Cleveland, Ohio, U.S.A. Application date, December 27, 1923.

In the usual process for making hydrochloric acid and salt cake by heating a mixture of nitre cake (acid sodium sulphate)



226,042

and sodium chloride, the nitre cake is crushed, mixed with salt, and fed into a furnace. This involves the cooling of the nitre cake as it comes from the nitre pots, breaking, grinding, and mixing it, and the object is to avoid this disadvantage by feeding the molten nitre cake directly to a salt cake furnace. Nitre cake flows from the nitre pot or storage tank 1 through a channel 2 to a receptacle 3, which is heated by waste gases from the salt cake furnace *A*, which pass into the chamber 4 through the conduit 5. The molten nitre cake is delivered by a constant feeding device 8, 9 to the trough 7, and thence through a conduit 12 and distributor 13. Salt is supplied from a hopper 14 by a conveyor 15, which delivers it to a shoot 16, and thence on to the hearth at an adjacent point. This apparatus is found to increase the capacity of a salt cake furnace by 60–70 per cent.

226,071. ARTIFICIAL HORN AND IVORY FROM VISCOSE, PROCESS FOR MAKING. E. Bader, 11, Elsenstrasse, Berlin-Treptow, H. Eggert, 5, Buchhorstrasse, Woltersdorf bei Orkner, Germany, and A. Wagner, 9, Engelufer, Berlin, S.O.16. Application date, March 5, 1924.

In the manufacture of "viscoid" from viscose it has been found that very prolonged washing is necessary to remove the the alkali and alkali sulphide, and this prolonged washing has an injurious effect on the substance when subsequently dried. This disadvantage may be avoided by treating the crude viscose solution with heavy metal salts, or alkaline earth salts which readily give off their inorganic or organic residues to the alkali. Some metallic oxides and hydroxides such as aluminium or zinc hydroxide, which form compounds with alkali and alkali sulphides, may also be used. In an example, crude viscose is agitated with an excess of aluminium hydroxide at 15° C. and then moulded. After coagulation has taken

(Continued on page 59)